ELSEVIER

www.elsevier.com/locate/worlddev

World Development Vol. 37, No. 10, pp. 1683–1693, 2009

0305-750X/$ - see front matter

doi:10.1016/j.worlddev.2009.03.013

Child Labor in Carpet Weaving: Impact of Social Labeling in India and Nepal

SAYAN CHAKRABARTY
Shahjalal University of Science and Technology, Sylhet, Bangladesh

and

ULRIKE GROTE *
Leibniz University Hannover, Hannover, Germany

Summary. — Does the labeling of tradable products like carpets which have been produced without child labor increase the welfare of children and their families? This paper presents results of surveys conducted in India and Nepal. The findings suggest a positive link between social labeling and the removal of child laborers for households above the subsistence level. However, for households below the subsistence level, no significant influence has been found.

Key words — social labeling, child labor, luxury axiom, nutritional efficiency wage, India, Nepal

1. INTRODUCTION

South Asia remains home to the largest number of working children in the world. A conservative estimate is that some 20–30 million live in five large South Asian countries. But on an average, the percentage of working children in the age group 5–14 varies between 5% and 42% in five major countries in South Asia: Bangladesh: 19%, India: 5%, Nepal: 42%, and Pakistan: 8%. India leads in terms of total number of child laborers. According to the population census of India (2001), around 12.6 million child laborers below 14 years of age work in India. For Uttar Pradesh which is one of the Indian states where the carpet industry plays a prominent role, the National Sample Survey (2004–05) in India reports that there were more than a million child laborers. Deborah, Anker, Ashraf, and Barge (1998) estimate that in the Indian hand-knotted carpet industry about 22% of the total workforce consist of children which is equal to as many as 130,000 children. A more recent study by Sharma (2003) provides estimates of the incidence of child labor in both looms under social labeling and non-labeling. The incidence of child labor in looms not covered under any social labeling initiative is estimated to amount to about 24% while this varied between 7% to close to 18% in looms covered under social labeling initiatives.

The extent of child labor in Nepal is more severe than in India. There, the incidence of child labor is similar to that of Sub-Saharan Africa where the highest proportion of working children exists. The estimates show that almost one child in three below the age of 15 is economically active in Nepal. According to Gilligan (2003), each child laborer is a tangible living symbol of a vulnerable and marginalized family in Nepal, and two million children aged 5–14 are classified as employed in Nepal. In a study by the Child Workers in Nepal Concerned Center (CWIN, 1993) from the early nineties, 365 carpet factories within the Kathmandu Valley were surveyed, and it was estimated that about 50% of the total 300,000 laborers were children. A more recent study by ILO (2002) estimated that about 7,700 or 12% of the total 64,300 laborers were child laborers in the carpet firms of the Kathmandu Valley. Charlé (2003) mentions that an estimated 1,800 children under the age of 14 are illegally employed by Nepal's carpet industry.

In order to reduce the occurrence of child labor in the carpet industry, measures and initiatives such as "Social Labeling" or "Codes of Conducts" have been proposed and developed in the recent past. Social labeling acts as a signal in the market, informing consumers about the social conditions of production, and assuring them that the item or service they purchase is produced under equitable working conditions (Hilowitz, 1997). It is praised as a market based and voluntary, and therefore a more attractive instrument to raise labor standards (Basu, Chau, & Grote, 2006). Thus, non-governmental organizations (NGOs) such as the Rugmark Foundation, Care & Fair, or STEP were established in the mid-nineties to encourage manufacturers of hand-knotted carpets to produce them without child labor. The Rugmark Foundation, established by "Brot für die Welt," "Misereor," "terre des hommes," and UNICEF in 1995, aims at eliminating the employment of children in the carpet industry by assigning the Rugmark label to carpets made without child labor. Most Rugmark carpets are shipped to Germany which accounts for 30% of the hand-knotted carpet imports from India (US Department of Labor, 1997). Care & Fair is an association established by the German federation of carpet importers. While the NGOs differ in their approaches and objectives, they operate within a broader common goal—the removal of child labor. The common basic goals of the NGOs are to eliminate child labor from the hand-knotted carpets and also to rehabilitate the former child carpet workers.

* We would like to thank Arnab K. Basu, Nancy Chau, Guido Luechters Alok N. Sharma, and Bal Kumar K.C for their helpful comments and suggestions. The research was funded by the BMZ (the Federal Ministry for Economic Cooperation and Development, Germany) through the DAAD (German Academic Exchange Service). Final revision accepted: March 18, 2009.

Some initiatives such as Rugmark monitor production sites themselves to ensure that the label's requirements are fulfilled. In contrast, Kaleen and STEP hire external agencies to monitor, thus contributing to an increased trustworthiness of the label. Care & Fair is abstaining from monitoring. While Rugmark and Kaleen label individual products, STEP and Care & Fair label the company as a whole. In accordance with its philosophy, Care & Fair India runs hospitals to provide health care to the carpet weavers and workers. The Rugmark initiative has mobile clinical facilities to provide health care to the households, and they also provide some health benefits in their rehabilitation centers. There are some schools and adult education centers constructed and managed by Rugmark for a better opportunity of child schooling and adult training throughout the carpet weaving areas. These supply side actions in the child labor market, as provided by social labeling NGOs, are very important to address the child labor problem. To finance these initiatives, licensed exporters have to contribute 0.25% of the fob price to the Rugmark foundation (Sharma, 2003). Importers who join the program contribute 1.75% of the costs of the rugs (Charlé, 2003).

Although the issue of child labor ranks high in the international trade policy debates, there has been relatively little empirical work on it so far. This empirical study analyzes how social labeling affects the labor force status and schooling of children. It focuses on the labeling program Rugmark which has been in operation now for about 10 years in India and Nepal. Understanding the effects of social labeling on child labor and schooling is crucial, as it is expected to increase human capital accumulation which again is one of the main prerequisites for long-term growth. The results of this research also contribute to a better understanding of whether the marketing signals carried by the logos of labeling NGOs are able to reduce child labor or not.

The structure of this paper is as follows: Section 2 gives an overview of the theoretical and empirical literature related to child labor and social labeling. Based on the literature review, some hypotheses are derived for empirical testing. Section 3 describes survey sampling, stratification techniques, and the econometric model used in the study for India and Nepal. The results of the econometric analyses are presented in Section 4, and Section 5 concludes.

2. REVIEW OF LITERATURE

Comprehensive literature reviews related to child labor have been provided, for example, by Basu (1999), Brown, Deardorff, and Stern (2002), Cigno and Rosati (2005) or by Edmonds (2007). This review focuses on two specific aspects which are related to child labor and which are of particular interest in the context of this article: these are the effects of globalization and trade liberalization on child labor and the impact of social labeling on child labor. The major empirical and theoretical studies will be presented reflecting some of the main arguments raised in the child labor literature. The strand of literature highlighting the link between globalization and the incidence of child labor is of importance in the context of this article since carpet weaving—a business which is susceptible to child labor—takes place in the developing countries with its products being consumed in the developed countries. Globalization affecting the carpet business is thus likely to impact on the occurrence of child labor. The second strand of literature being of interest relates to demand-side measures: these refer in particular to social labeling which is often complemented by other demand-side measures such as schooling or provision of health care centers. Finally, some hypotheses have been derived from the literature which will be tested empirically in Section 4.

(a) *Globalization and the incidence of child labor*

In recent years, a discussion about the impact of globalization and trade liberalization on the incidence of child labor has started in the literature. Maskus (1997) develops a theoretical model of an economy that produces an export- and import-competing good with some sector-specific factors. Child labor is employed only in the informal sector supplying inputs to the export sector. Taking globalization as an expanded opportunity to engage in the international trade, a larger export sector will raise the demand for child labor inputs which again will be accompanied by a rise in the child's wage. It can be concluded that the rise in the child's wage will raise the return to work relative to the return to education, thus leading to increased child labor.

Basu and Van (1998) and Basu (2002) model a family in which altruistic parents withdraw their children from the labor force once adult wages reach some critical level. Consequently, the supply of labor begins to bend back. Once child labor has been reduced to zero, the supply of labor resumes its upward slope. There are then two stable equilibria: a low-wage equilibrium characterized by child labor and a high-wage equilibrium in which all children are attending school. Developing countries may be stuck in this low-wage child labor trap. However, trade openness may help families approach or even exceed the critical adult-wage level at which child labor begins to decline.

Apart from these theoretical papers, there are also a number of empirical ones investigating the link between globalization and child labor. Neumayer and de Soysa (2005) argue that countries being more open toward trade and/or having a higher stock of foreign direct investment also have a lower incidence of child labor. They conclude that globalization is associated with less, not more, child labor. Edmonds and Pavcnik (2006) explore the relationship between greater exposure to trade and child labor in a cross country setting. They account for the fact that trade flows are endogenous to child labor by investigating the relationship between child labor and variation in trade based on geography. They find that countries that trade more have less child labor. Cigno, Rosati, and Guarcello (2002) also find no empirical evidence that globalization *per se* increases child labor. Consistent with the trade theory and household economics, they find a comparatively well-educated workforce, as well as active social policies, to inevitably leading to a reduction in child labor. According to them, for countries with a largely uneducated labor force, the problem is not so much globalization, as being allowed to take part in it.

In an empirical study on Vietnam, Edmonds and Pavcnik (2005) analyzed the effect of liberalized rice trade. They find that despite greater employment opportunities, children in households that benefit from higher rice prices are much less likely to work. Contrary to this, Kruger (2007) tested in a more recent study in Brazil how increases in the country-level value of coffee production affect child labor. She finds that increases in the value of coffee production lead to more children being withdrawn from schools and sent to work. Thus, she concludes that during periods of economic growth, education of the poor may be adversely affected.

(b) *Social labeling and child labor*

The literature related to social labeling and child labor is just evolving, and mainly restricted to theoretical articles. Basu, Chau, and Grote (2006) provide a theoretical model of

North–South trade and explore the impacts of social labeling on the four often-noted objectives: child labor employment, consumer information, welfare, and trade linkages. They highlight the market responses to social labeling when product market competition between the North and South is based on both comparative cost advantage and the use of child labor as a hidden product attribute. They find that consumers and Southern producers benefit, while children and Northern producers are worse off. Trade sanctions on unlabeled products deteriorate Southern terms of trade, but do not affect the incidence of child labor in any way. Furthermore, a threat to sanction the import of unlabeled Southern products discourages the South from maintaining a credible social labeling program. In general, the level of monitoring in place critically determines the employment effects of social labeling.

A different model is offered by Baland and Duprez (2007). They find that when most producers in the South are eligible to obtain the label, its effectiveness is considerably reduced by a displacement effect. This effect implies that adult laborers replace child laborers in the export sector, while child laborers replace adult laborers in the domestic sector. The label is then not able to create a price premium for the labeled goods as compared with unlabeled goods. However, when there is only a small fraction of producers with access to the label, then the labeled producers generally gain as opposed to the losing nonlabeled producers. The impact on child labor is in general ambiguous, depending on the strength of the income and substitution effects.

Brown (2006) theoretically analyzes the economic mechanics and consequences of product labeling. When product labeling is applied to child labor, she finds that even in the optimistic case in which consumers pay a labeling premium that exceeds the additional cost of adult-only technology, there is no net reduction in the labor force participation of children. Children are better off only when the price premium (i.e., a transfer from the consumers in the North to the children in the South) is used for their benefit.

Besides these theoretical papers, there are a number of empirical papers highlighting selected policy issues. Thus, Hurtado (2002) discusses the legality of government-sponsored social labeling initiatives under WTO agreements. He first presents the basic characteristics, potentials, and shortcomings of labeling initiatives and then suggests a drive toward government sponsorship as a way to correct the shortcomings. He then moves on to analyze these initiatives under the relevant GATT and Technical Barriers to Trade (TBT) Agreement provisions. Hilowitz (1997) discusses various issues related to voluntary social labeling with reference to child labor. Six initiatives are described and some examples are given for specific instances of labeling. Sharma (2003) examines the impacts of the labeling initiatives *vis-à-vis* child labor. He looks at working mechanisms of labeling NGOs and highlights the major strengths and weaknesses of social labeling.

It can be summarized from the literature review that there is no clearcut evidence on how globalization in general and social labeling in particular impact on child labor. The theoretical as well as the empirical literature comes to ambiguous results on the possible outcomes for working children and their families. However, it also leads to some concrete hypotheses which can be empirically tested and which will be further explained in the following.

(c) *Selected hypotheses on child labor*

The effectiveness of labeling products in terms of reducing child labor depends to a large extent on the links between household income or calorie intake and child labor. This specific aspect will be included in the empirical part of this paper by testing two major hypotheses. One essential hypothesis which is drawn from the above-mentioned Basu and Van (1998) model is called the "luxury hypothesis." It implies that a household would not send its children to work if its income from non-child labor sources were sufficiently high. Therefore, if adult wage/income increases, the probability of the incidence of child labor decreases and *vice versa.* Assuming parental altruism, child labor is due to parents' low income. Based on the luxury hypothesis, it might be well argued that children stop working once a household exceeds the subsistence level in terms of calorie intake.

A larger calorie intake reduces the number of required breaks or leisure time and thereby increases the number of potential working hours (Hemmer, 1979). This "nutritional efficiency wage argument" explains a situation where income elasticity of leisure or schooling is negative (inferior good) assuming that income equals consumption. In other words, a certain minimum calorie intake is absolutely necessary for 100% efficiency, and if this requirement is only partially met or not met at all, the worker is insufficiently productive or incapable of continuing work (Hemmer, 1979; Subramanian & Deaton, 1996). The development literature shows that there is a functional relationship between nutrition and productivity leading to the nutritional efficiency wage argument (Bliss & Stern, 1978; Leibenstein,1957; Stiglitz, 1976). According to this argument, a larger calorie intake reduces the number of required breaks or leisure time and thereby increases the number of potential working hours. Therefore, low wage results in low consumption and, thereby lowering labor productivity; paying a lower wage may raise the cost per efficiency unit of labor (Swamy, 1997).

At very low levels of income and hence nutrition (below-subsistence), the effort that household members (including children) are able to exert may be positively influenced by an increase of calorie intake as long as the household reaches the subsistence level. Therefore, the below-subsistence households might send their children to work in order to be able to reach the subsistence level. This result is obviously an obstacle for social labeling NGOs since it would mean that labeling does not have any impact on poorer households living below the subsistence level. Based on this line of argument, the whole sample in this study was subdivided into two groups based on a certain poverty threshold to test the nutrition-based efficiency wage model.

3. DATA AND METHODOLOGY

In the following, the sampling procedure and the stratification technique based on which the primary data from the carpet industry in Nepal and India were collected, as well as the econometric model are outlined.

(a) *Survey Sampling*

In 2005, primary data were collected from 415 households in Uttar Pradesh, India and from 410 households from Kathmandu Valley, Nepal. In order to decrease the variances and therefore to increase the efficiency of the tests and the precision of the estimators, it was necessary to control for the influence of confounding variables which might lead to the heterogeneity problem, thus disturbing the main analysis. This was done by partitioning the population with respect to the following three main factors:

i. Administrative and social difference of regions.
ii. Status of the households with children (labeling or not).
iii. Important time points (e.g., before and after NGOs came into operation (before and after 1995)).

Within Uttar Pradesh and Kathmandu valley, this research followed the plan of stratifying in sub-spatial partitions, that is, by taking an independent random sample from each of the three sub-regions of Uttar Pradesh (see Appendix A) and Kathmandu Valley (see Appendix B). To account for regional differences the survey site was chosen on the basis of concentrated carpet firms in three districts of Eastern India namely Mirzapur, Bhadohi, and Varanasi and in three districts of Kathmandu Valley namely Kathmandu, Lalitpur, and Bhaktapur.

The major challenge of the field research for this study was locating the stratified households and getting a large enough sample size, so that a reasonable degree of confidence could be reached with statistically significant results. Stratifying the sample included (i) identifying the carpet enterprises which were registered by the labeling NGO Rugmark, and (ii) differentiating between labeling and non-labeling households. To compare the situation of labeling and non-labeling households, approximately 50% of the surveyed households were classified as Rugmark producers whereas the other 50% did not in any way relate to Rugmark or any other labeling program. In the case of Nepal, a labeling household was defined as a household where at least one person was working in firms registered by labeling NGOs and no member was working in other non-labeling carpet firms. A non-labeling household was defined as a household where at least one member was working in the unregistered (non-labeled) carpet firm and no member of this household was working in a registered (labeled) carpet firm. Based on the lists from Rugmark, some households from the labeled carpet firms were selected next to households from the non-labeled carpet firms from the same area. In the case of India, a labeling household was defined based on whether the head of the household knew about the main objective of labeling NGOs. [1]

It needs to be pointed out that it is not the head of the household or parent of a child who decides to work for Rugmark or any other labeling program. It is rather the exporter of the carpets who decides whether he or she gets involved in the trade with Rugmark-labeled carpets. The exporter then informs his or her wholesaler who again informs the carpet loom owners about the prerequisites and requirements of the Rugmark label—with different levels of efficiency. Hence, the decision of joining a labeling program is not taken by the household and the knowledge about Rugmark depends to a large extent on the information flow along the value chain; therefore, taking a random sample of labeling and non-labeling households does not lead to any sample selection bias, and also the identification problem of the analysis can be avoided.

(b) *Econometric methodology*

To determine the factors which lead to child labor and to test empirically whether the luxury hypothesis as well as the nutritional efficiency wage argument is valid, binary multiple logistic regression is used to estimate the probability that a child is being employed in the following way:

$$Logit(P) = ln\frac{P}{1-P} = \alpha + \beta' X \quad (1)$$

where P is the probability (Child is employed | X); α is the intercept parameter; β is the vector of slope parameters; and X is the vector of explanatory variables.The null hypothesis is $\beta = 0$. The explanatory variables (X_H) describe household characteristics. A description of the variables used for the econometric analysis is provided in Table 1.

To be able to test the efficiency wage argument, the households were divided into two groups based on their nutritional status: one group is below subsistence and the other group is above subsistence in terms of calorie consumption. It is assumed that there is a threshold level of energy intake X^* below which the households send their children to work. This is because their adult *per capita* productivity is so low that they depend on their children's salary to secure their basic energy requirements. A person is counted as "food poor" if the nutritional content of the food(s) he or she consumes is less than the prescribed threshold X^*. As a simplifying assumption, most countries use dietary energy as a proxy for the overall nutritional status, that is, if a person gets enough energy, then he or she also gets adequate protein and the other essential nutrients (David & Joshua, 2005).

Edmonds (2005) defines "poorest households" as households with a *per capita* expenditure below of what is needed to purchase 2100 calories per day. But *per capita* calorie requirements at minimum activity levels differ according to age, gender, weight, *etc*. For own calculations this study follows a scale from the World Health Organization as used by Babu (no year). Calorie requirement is then defined according to age and gender assuming a fixed weight (gender basis) and basal metabolic rate. Cultural factors can also deprive members of the household (i.e., women and children) from getting an equitable share. However, it is assumed in this study that household members' strong family ties would ensure that food is shared equally.

The data which are needed to calculate the *per capita* calories consumed by the members of the households are obtained via a 24 h recall from all members of the household. The total energy consumption $\sum kcal$ of each sample household is derived from the net amounts of food commodities consumed, converted into energy and different micronutrients. *Per capita* values are generated by dividing $\sum kcal$ by the number of consuming members in the households in the last 24 h taking the different calorie needs of individual household members into account. The subsistence level is then calculated by the difference between *per capita* calories consumed by a household and the *per capita* calories required for a household. If the sign is negative, the household is below the subsistence level or classified as (calorie) non-poor, and *vice versa*.

4. ECONOMETRIC RESULTS

In the following, the econometric results obtained from analyzing the collected primary data on social labeling issues are presented. More in detail, the luxury hypothesis and the nutrition efficiency wage argument are tested. Moreover, the monitoring of social labeling is further investigated due to its importance with respect to the overall trustworthiness of such programs.

(a) *The luxury hypothesis and determinants of child labor supply*

The results of testing the influence of variables on the chance of being a child laborer at the household level are shown in Tables 2 and 3 for Nepal and India, respectively. The labeling status of a household has been found to be an important factor in determining whether a child works or not. The labeling status is "yes" if a member of the household works in a labeled

Table 1. *Variable definitions used for econometric analysis*

Variable name	Variable description	Type of the variable
HH Id	Household Id	Key
HH HoHAge	Age of the head of household	Continuous
HH HoHSex	Gender of the head of household	Binary Categorical
HH HoHEdu	Education of the head of household	Categorical
HH Size	Actual total permanent members of the household	Continuous
HH IncGT14	Last month total income of family members older than 14	Continuous
HH Debts	Actual total outstanding debts incl. interest and costs	Continuous
HH NoChildren	Total number of children ($\geqslant$14)	Continuous
HH LabelInd	Is anybody of the family working in a labeled industry?	Binary Categorical
HH absolutePov	Households with less than US$ 1 per day (Absolute poverty)	Binary Categorical
HH IsAnyChildLab	At least one child has been working in the last two months either full time or part time	Binary Categorical
HH KalPC	*Per capita* calorie intake	Continuous
HH NoChildrenSchool	Total number of school going children	Continuous

Table 2. *Logit regression results for the probability of child labor in Nepal*

Analysis of maximum likelihood estimates		Odds ratio estimates			
Parameters		Estimate	Points estimate	90% Confidence limits	
Intercept		0.79			
HH LabelInd	Registered *versus* Unregistered	−0.37 ***	0.48	0.30	0.77
HH IsAbsDolPov	No *versus* Yes	0.82	5.10	0.93	28.1
HH HoHSex	Female *versus* Male	−0.15	0.74	0.30	1.87
HH HoHEdu	Primary education vs. No education	−0.39 **	0.46	0.27	0.79
HH IncGT14		−0.78 **	0.46	0.26	0.82
HH NoChildren		1.30 ***	3.69	2.45	5.54
HH Debts		0.15 *	1.16	1.00	1.33
HH HoHAge		0.22 **	1.24	1.05	1.46
HH NoChildrenSchool		−1.27 ***	0.28	0.20	0.39
HH Size		−0.42 ***	0.66	0.51	0.85

Note: dependent variable: "HH IsAnyChildLab" (Yes/No), (household level, $N = 410$).
* Significant at 10%.
** Significant at 5%.
*** Significant at 1%.

carpet firm and no member works in a non-labeled carpet firm. The knowledge about labeling NGOs is "yes" if the head of the household is well informed about the objective of Rugmark. Tables 2 and 3 show that for each household, the magnitude of the estimated child labor decreases with labeling NGO's intervention. The estimated odds ratio of the labeling status is 0.48 [2] for the household-wise regression in Nepal. This means, that the odds of having a child laborer in the family not being assisted by an NGO are more than 2 times [3] the odds of having a child laborer in an NGO-assisted family in Nepal. In India, the estimated odds ratio of the labeling status is 0.58 [4] for the household-wise regression. This means, that the odds of having a child laborer in the family who has no knowledge of labeling NGOs are more than 72% [5] of the odds of having a child laborer in a family who has NGO knowledge. Therefore, in both countries the probability of child labor increases in the carpet firm when the household is not involved with labeling NGOs.

Following the luxury hypothesis of Basu and Van (1998), this study tests whether there is a negative relationship between child labor and adult income ("HH IncGT14" scaled adult's income in 5,000 Rupies). It can be concluded that the sign and the statistical significance of the estimated adult income coefficient support the Basu & Van model in the Nepali case but reject the hypothesis in the context of India. The estimated odds ratio for adult income is 0.46 in the household level regression in Nepal. This means, that for each additional 5,000 Rupies increase in adult income, the odds for child labor decrease by more than half (44%) at the household level. This shows a strong and a negative association between the adult income and the child labor in the household. Though the direction of the impact of adult income on child labor is the same for both countries, adult income has no significant influence on child labor in the carpet belt of India.

In the household level regression, there is a positive correlation between child employment and family debts ("HH Debts": scaled household's debt in 5,000 Rupies) but it is significant only in Nepal and nearly significant in India [6]. This means that the odds of child employment are increased by around 16% if the debt burden of the household rises by 5,000 Rupies in Nepal.

Improvement in the head of the household's education ("HH HoHEdu") decreases the probability of a child's employment in the labor market. This is confirmed by the negative and significant estimates of the odds ratio of "at least primary education" and "no education" in the household level regression in Nepal but it is not significant in India. The estimated odds ratio for "head of the household's education" is 0.46 in the family-wise regression. This means that the odds of child labor are about 54% lower for those households and children where the head of the household completed at least primary school compared with those households where the

Table 3. *Logit regression results for the probability of child labor in India*

Analysis of maximum likelihood estimates				Odds ratio estimates		
Parameters		Estimate		Points estimate	90% Confidence limits	
Intercept		0.55				
HH LabelInd	NGO knowledge *versus* no NGO knowledge	−0.27	***	0.58	0.37	0.90
HH HoH Sex	Female *versus* male	0.02		1.03	0.46	2.29
HH HoH Edu	Primary education *versus* no education	−0.12		0.79	0.49	1.29
HH IncGT14		−0.03		0.97	0.84	1.12
HH NoChildren		0.85	***	2.35	1.74	3.18
HH Debts		0.01		1.01	0.99	1.03
HH HoHAge		0.05		1.05	0.90	1.23
HH NoChildrenSchool		−1.26	***	0.28	0.21	0.37
HH Size		−0.23	*	0.79	0.63	0.99

Note: dependent variable: 'HH IsAnyChildLab' (Yes/No), (household level, $N = 415$).
* Significant at 10%.
*** Significant at 1%.

head of the household has no education in Nepal. This shows a strong and a negative association between the education status of the head of the household and child labor in Nepal.

The age of the head of the household ("HH HoHAge": scaled head of the household's age in 5 years of age) shows a significant and a positive effect on child labor supply in the household level regression for Nepal. The use of children as a form of insurance (Pörtner, 2001) also provides some insight into the role of the "age of the head of the household" in determining child labor. The idea behind this might be that the older the head of the household is, the more will he or she be aware of his/her dependency for livelihood in the future. Child laborers could be seen as an "economic insurance" in old age for the head of the household. Thus, the probability of a child to work is increasing with the age of the household head. The estimated odds ratio for "age of the head of the household" is 1.24, which means that the odds of child labor are 24% higher for each 5 years increase in the age of the household head. This shows a positive association between the age of the head of the household and child labor in Nepal which is not significant in India.

The sign of the coefficient of the size of a household "HH Size" shows that with an increase in the household size, the probability of child labor decreases in both India and Nepal. This is contrary to what would have been expected, however, it might be explained by an increased number of adults—and not children—in the household. In fact, the more adults there are in the household, the less likely it is that a child works. The variable "total number of children" ("HH NoChildren"), however, shows a statistically significant and positive relation with the occurrence of child labor in India and Nepal. This indicates that the higher the number of children in a household, the more likely it is that some children of this family will go to work.

The estimated odds ratio for "total number of children" is 3.69 for Nepal and is 2.3 for India which means that the likelihood (odds) of a child to work increases by the factor 3.7 (Nepal) and 2.3 (India) for each additional child in the household. This shows a strong and positive association between "total number of children" in a family and the probability of child labor, which is described frequently in the literature (Patrinos & Psacharopoulos, 1995). In other words, the higher the probability that a child will work, the higher the probability of an additional birth in the household (Cigno & Rosati, 2002).

(b) *Social labeling and the nutritional efficiency wage argument*

Tables 4–7 present the coefficient estimates of the logit regressions of child labor participation for two different groups of households (above and below subsistence) in India and Nepal. First of all, important differences are derived from the calorie intake (HH KalPC) of the two household groups.

In the above-subsistence level households, the relationship between the calorie intake and the child labor is negative and not significant (see Table 4 for India and Table 5 for Nepal). This implies that a child living in an above-subsistence household group is less likely to work, when his or her calorie intake increases.

For the very poor households, however, the estimated odds ratio for the *per capita* calorie intake is 1.53 in India (see Table 6), while in Nepal, it is 5.31 (see Table 7). This means, that for each additional increase of 500 kcal in the family consumption, the odds for child labor increase by 53% in India and more than 5 times in Nepal. Thus, the statistical significance of the "calorie intake" coefficient in the below-subsistence households suggests a significant growth in child employment with an increased calorie intake. This result supports the "efficiency wage argument," showing that when calorie intake goes up, children are healthier, work more hours and get better paid and contribute more income to their families (Leibenstein, 1957). Therefore, the statistically significant poverty trap under the subsistence level stimulates child labor.

The following important questions arise from this result: can social labeling NGOs have an impact through their welfare activities on the very poor households? Are they able to release the poorest households from the poverty trap? In fact, what has been found in this study is that in both groups, the labeling status of the households (HH LabelInd) leads to a decrease in child labor. However, the statistical significance of the coefficient is different in the below- and above-subsistence regressions. While for the very poor households, no significant influence by the labeling status is found, the odds of a child to work in labeling households are 90% lower in the case of India and are 53% lower in the case of Nepal in the above-subsistence group. Thus, while the labeling NGOs could increase household's welfare, they could not neutralize or reduce the effect of the "food poverty trap" in the below-subsistence households.

It can be concluded, that labeling NGOs are successful in removing child labor in the above-subsistence households, a group for which the nutritional efficiency wage argument does

Table 4. *Logit regression results for the probability of child labor in India, households who are above the subsistence level*

Analysis of maximum likelihood Parameters		Odds ratio estimates				
		Estimate		Points Estimate	90% Confidence Limits	
HH LabelInd	NGO knowledge *versus* no NGO knowledge	−1.15	**	0.10	0.01	0.77
HH HoHSex	Female *versus* male	−0.88		0.17	0.01	2.86
HH HoHEdu	Primary education *versus* no education	1.22		0.08	0.001	274.827
HH KalPC		−0.84		0.43	0.10	1.74
HH NoChildren		2.68	***	14.60	2.66	80.12
HH Debts		0.01		1.01	0.96	1.06
HH HoHAge		0.97	***	2.65	1.29	5.46
HH NoChildrenSchool		−1.90	***	0.15	0.05	0.46
HH Size		−2.31	***	0.09	0.02	0.46

Note: dependent variable: HH IsAnyChild0514Lab, household level, $N = 133$.
** Significant at 5%.
*** Significant at 1%.

Table 5. *Logit regression results for the probability of child labor in Nepal, households who are above the subsistence level*

Analysis of maximum likelihood Parameters		Odds ratio estimates				
		Estimate		Points estimate	90% Confidence limits	
HH LabelInd	Registered *versus* unregistered	−0.37	**	0.47	0.26	0.86
HH IsAbsDolPov	No *versus* Yes	−0.14		0.76	0.16	3.66
HH HoHSex	Female *versus* male	0.05		1.13	0.30	4.27
HH HoHEdu	Primary education *versus* no education	−0.47	**	0.39	0.19	0.79
HH KalPC		0.37		1.45	0.98	2.14
HH NoChildren		1.65	***	5.22	3.19	8.56
HH Debts		0.17		1.18	0.93	1.52
HH HoHAge		0.11		1.12	0.91	1.37
HH NoChildrenSchool		−1.39	***	0.25	0.16	0.38
HH Size		−0.71	***	0.49	0.36	0.68

Note: dependent variable: HH IsAnyChild0514Lab, household level, $N = 290$.
** Significant at 5%.
*** Significant at 1%.

not apply. However, children from below-subsistence households are engaged in economic activities because of the subsistence trap due to the nutritional efficiency wage argument. The labeling status of the below-subsistence household has no significant impact on a child's working status.

(c) *Monitoring frequency and child labor*

One of the main factors, which influences the success of labeling products, is "monitoring frequency." In the above section, "monitoring frequency" was not considered as an explanatory variable because of the high collinearity with "HH LabelInd" (Is anybody of the family working in a labeled firm?).

Rugmark has its own inspection and random monitoring system of its member's loom. It would be important to answer the question: is there any association between monitoring by the labeling NGOs and child laborers working in a carpet firm? It is hypothesized that the presence of a monitoring strategy by the labeling NGOs decreases the incidence of child labor in carpet firms.

Tables 8 and 9 represent a 2 × 2 contingency table for India and Nepal, cross classifying the child laborer's monitoring status and the full time working status for more than 20 days within the last two months. Here, child labor is a response variable and monitoring is an explanatory variable. We therefore study the conditional distributions of child labor, given the monitoring status. The proportions (25.4% for child labor, and 74.6% for no child labor in Nepal; 29.8% for child labor and 70.1% for no child labor in India) are non-monitoring sample conditional distributions of child labor. For positive monitoring, the sample conditional distributions are 9% (Nepal) and 27.4% (India) for child labor and 91% (Nepal) and 72.5% (India) for no child labor.

The sample relative risk [7] is 2.78 for Nepal and 1.08 for India, that is, the sample proportion of child laborer with no monitoring is 2.78 times the proportion of positive monitoring cases in Nepal and the sample proportion of child laborer with no monitoring is 8% the proportion of positive monitoring cases in India. The estimated relative risk means that the probability of child labor is higher for those with no monitoring

Table 6. *Logit regression results for the probability of child labor in India, households who are below the subsistence level*

Analysis of maximum likelihood Parameters		Odds ratio estimates			
		Estimate	Points estimate	90% Confidence limits	
HH LabelInd	NGO knowledge *versus* no NGO knowledge	−0.23	0.63	0.39	1.02
HH HoHSex	Female *versus* male	0.21	1.52	0.59	3.92
HH HoHEdu	Primary education *versus* no education	−0.11	0.81	0.48	1.33
HH KalPC		0.43 *	1.53	1.01	2.30
HH NoChildren		0.67 ***	1.95	1.42	2.70
HH Debts		0.01	1.01	0.99	1.03
HH HoHAge		−0.04	0.95	0.80	1.13
HH NoChildrenSchool		−1.18 ***	0.31	0.23	0.41
HH Size		−0.09	091	0.71	1.16

Note: dependent variable: HH IsAnyChild0514Lab, household level, $N = 282$.
* Significant at 10%.
*** Significant at 1%.

Table 7. *Logit regression results for the probability of child labor in Nepal, households who are below the subsistence level*

Analysis of maximum likelihood Parameters		Odds ratio estimates			
		Estimate	Points estimate	90% Confidence limits	
HH LabelInd	Registered *versus* unregistered	−0.40	0.45	0.17	1.22
HH HoHSex	Female *versus* male	−0.87	0.18	0.023	1.36
HH HoHEdu	Primary education *versus* no education	−0.32	0.53	0.17	1.59
HH KalPC		1.67 ***	5.31	1.69	16.67
HH NoChildren		1.40 ***	4.47	1.84	10.83
HH Debts		0.28 *	1.33	1.01	1.74
HH HoHAge		0.43 *	1.54	1.03	2.29
HH NoChildrenSchool		−1.71 ***	0.18	0.084	0.38
HH Size		−0.32	073	0.38	1.43

Note: dependent variable: HH IsAnyChild0514Lab, household level, $N = 120$.
* Significant at 10%.
*** Significant at 1%.

Table 8. *Cross tabulation of monitoring status and child labor in India*

Monitoring within last two months by labeling NGO	Child labor		
	Yes	No	Total
No	174	409	330
	29.8%	70.1	100.0%
Yes	47	124	79
	27.4%	72.5%	100.0%
Total	221	533	754
	29.3%	70.7%	100.0%

than for those with monitoring. With respect to monitoring, it was also observed, that Rugmark inspectors took initiative to monitor the weaving of carpets but not the other intermediate sectors such as washing, dyeing, and spinning carpets. Thus, a number of children were found to be working in the spinning firm.

5. CONCLUSIONS AND POLICY IMPLICATIONS

The intervention of social labeling NGOs leads to an improvement in the welfare of children and households involved in the carpet firms. Thus, social labeling has been found to be an effective way of combating child labor. However, this is only true for the above-subsistence households, but not for the very poor households living below the subsistence level. Therefore, any policy to curb child labor should be aimed first at increasing the income of the below-subsistence group of households who are the most vulnerable in society.

In the above-subsistence group of households, the calorie intake does not determine whether children work or not. Therefore, labeling NGOs are successful to remove child labor by their welfare activities. However, in the below-subsistence households, calorie intake increases child labor because of the nutritional efficiency wage argument. Hence, labeling NGOs have no significant influence on the reduction of child labor supply in this group. The rationale behind this finding is that any welfare enhancing policy by labeling NGOs could directly or indirectly increase the nutrition level of the below-subsistence household members.[8] This implies that children are healthier, work more hours, and get better paid and contribute more to their family's income to reach the subsistence level. Since child leisure is a luxury item, the demand for it is higher in the above-subsistence group than in the below-subsistence group.

It essentially implies that eradicating child labor through social labeling would be successful if the national government could ensure basic consumption needs (at least the subsistence

Table 9. *Cross tabulation of monitoring status and child labor in Nepal*

Monitoring within last two months by labeling NGO	Child labor		
	Yes	No	Total
No	114	334	448
	25.4%	74.6%	100.0%
Yes	9	91	100
	9.0%	91.0%	100.0%
Total	123	425	548
	22.4%	77.6%	100.0%

level of consumption) for its population. Therefore, combinations of non-trade policies should be formulated by intervening through nutrition programs (food for education, food stamps, and food rationing) that allow a family to get over the subsistence trap. Above a certain level of nutrition (subsistence level), the households respond positively to the objective of labeling NGOs, that is, to decrease child labor supply.

Overall, frequent monitoring by labeling NGOs was found to have a positive effect on the reduction of child labor. However, there is always the danger that households who are driven by food poverty either shift their children to less visible sectors (e.g., from carpets to handicrafts), or across the production chain (e.g., from weaving to spinning), or move into the informal sector where conditions are likely to be more exploitative. In fact, it was found that a number of children are moved to the intermediate sector of carpet production, such as the spinning industry which is not monitored by the NGOs. Therefore, it is important to also monitor these sectors which have often more dangerous and hazardous working conditions than the weaving sector. In addition, the monitoring risk or moral hazard problem in monitoring which is caused by the large number of looms in the carpet industry could be avoided by substituting traditional technology with modern technology.

This research estimates a positive correlation between child employment and family debts which is nearly significant [9] in India. Mostly the uneducated people feel uncomfortable going to the institutional credit market due to paper works and bureaucracy. In addition, the poor people often lack collateral, so that they are not considered as being creditworthy by government or private banks. This leads to a high demand for informal credit among the carpet workers. As a result, the interest rate is very high in the informal credit market. Among the informal sources, the majority of the households receive loans from the industry owners, sometimes as an advance payment. Advance payments make the debtor liable to finish the work in time in order to receive another advance payment, and therefore, they use child labor to finish the work as early as possible. One of the instruments to break the credit cycle is "micro credit." The Grameen Bank model in Bangladesh might be followed in this regard and child schooling could be treated as the only "collateral" of the micro credit.

In this context it should be noted that the findings of the regression analysis support the luxury hypothesis by showing a positive relationship between adult income and child labor in the Indian carpet industry.

The most important factor in the analysis is the number of children under 14 years of age in the household; a household with more children is much more likely to send a child to work than a household with fewer children. Education is likely to lead to reduced number of children. Since improvement of the head of the household's education significantly decreases the probability of a child's employment in the labor market, adult education can also in this respect play a positive role in reducing child labor. The age of the head of the household shows a significant and a positive effect on child labor supply. Therefore, a micro-insurance policy could resolve the problem for old parents who might consider every child's birth as an insurance against their income loss.

NOTES

1. In India, the carpet production are scattered into different looms of households. Sometimes the members of the households have no idea whether they are belonging to any labeling program. Therefore, a question was designed whether the head of the household had any idea about the main objective of Rugmark.

2. In Table 3 the point estimator of the odds ratio of HH LabelInd of registered *versus* unregistered is 0.48 which is defined as:

$$0.481 = \frac{odds\ (any\ child\ in\ the\ family\ working | any\ one\ in\ family\ in\ registered\ industry)}{odds\ (any\ child\ in\ the\ family\ working | all\ in\ family\ in\ registered\ industry)}$$

3. $2.08 = \frac{1}{0.48}$.

4. In Table 4 the point estimator of the odds ratio of HH LabelInd of registered vs. unregistered is 0.58 which is defined as:

$$0.58 = \frac{odds\ (any\ child\ in\ the\ family\ working / household\ head\ has\ knowledge\ labeling\ NGOs)}{odds\ (any\ child\ in\ the\ family\ working / household\ head\ has\ knowledge\ labeling\ NGOs)}.$$

5. $1.72 = \frac{1}{0.58}$.

6. The null hypothesis is true for only 14% cases.

7. Testing this hypothesis allows an estimation of the relative risk as data were neither sampled nor analyzed retrospectively (Case control).

8. According to Engel's law the below-subsistence households spend a larger proportion of their income on food (inferior goods) than the above-subsistence households.

9. For nearly 14% of the cases, the null hypothesis is true.

REFERENCES

Babu, S. (no year). Poverty measurement and analysis. International Food Policy Research Institute. <http://www.ifpri.org/training/material/poverty/training_tuftspma.ppt#14> Accessed 15 Dec. 2008.

Baland, J.-M., & Duprez, C. (2007). *Are fair trade labels effective against child labour?* CEPR Discussion Paper No. 6259.

Basu, A. K., Chau, N. H., & Grote, U. (2006). Guaranteed manufactured without child labor: The economics of consumer boycotts, social

labeling and trade sanctions. *Review of Development Economics, 10*(3), 466–491.
Basu, K. (2002). A note on multiple general equilibria with child labor. *Economics Letters, 74*(3), 301–308.
Basu, K., & Van, P. H. (1998). The economics of child labor. *American Economic Review, 88*(3), 412–427.
Basu, K. (1999). Child labor: Cause, consequence, and cure, with remarks on International Labor Standards. *Journal of Economic Literature, 37*(3), 1083–1119.
Bliss, C. J., & Stem, N. H. (1978). Productivity, wages, and nutrition, Parts 2. *Journal of Development Economics, 5*(4), 331–398.
Brown, D. K. (2006). Consumer product labels, child labor and educational attainment. *Contributions to Economic Analysis & Policy, 5*(1), 1–27.
Brown, D. K., Deardorff, A. V., & Stern, R. M. (2002). *The determinants of child labor: Theory and evidence*. Research Seminar in International Economics (RSIE) Discussion Paper No.486, The University of Michigan.
Cigno, A., & Rosati, F. C. (2002). Child labour, education and nutrition in rural India. *Pacific Economic Review, 7*, 65–83.
Cigno, A., & Rosati, F. C. (2005). *The economics of child labour*. Oxford UP.
CWIN. (1993). *Misery behind the looms: child labourers in the carpet factories in Nepal*. Technical report, CWIN, Kathmandu, Nepal.
Charlé, S. (2003). Children of the looms: Rescuing the 'carpet kids' of Nepal, India and Pakistan. *Children, Youth and Environments, 13*(2).
David, F. N., & Joshua, W. (2005). Food for thought: The effects of school accountability plans on school nutrition. *Journal of Public Economics, 89*(2–3), 381–394.
Deborah, L., Anker, R., Ashraf, S., & Barge, S. (1998). Is child labour really necessary in India's carpet industry?. In R. Anker, S. Barge, S. Rajagopal, & M. P. Joseph (Eds.), *Economics of child labour in hazardous industries of India*. New Delhi: Hindustan Publishing.
Edmonds, E. V., & Pavcnik, N. (2005). The effect of trade liberalization on child labor. *Journal of International Economics, 65*(2), 401–419.
Edmonds, E. V. (2005). Does child labor decline with improving economic status?. *Journal of Human Resources, 40*(1), 77–99.
Edmonds, E. V., & Pavcnik, N. (2006). International trade and child labor: Cross-country evidence. *Journal of International Economics, 68*(1), 115–140.
Edmonds, E. V. (2007). *Child labor*. National Bureau of Economic Research (NBER) Working Paper No. 12926, Cambridge, MA.
Gilligan, B. (2003). Child labour in Nepal: An *analysis of the determinants of child labour in Nepal, the policy environment and response*. Technical Report, UCW, Kathmandu, Nepal.
Hemmer, H-R. (1979). Possible consequences of nutritional improvements for the economic development. *Intereconomics, 14*(4), 185–189.
Hilowitz, T. (1997). Social *Labelling to Combat Child Lab*our: Some considerations. *International Labour Review, 136*(2), 215–232.
Hurtado, C. L. (2002). Social labelling and WTO law. *Journal of International Economic Law, 5*(3), 719–746.
ILO. (2002). *A future without child labour : Report of the director general*. Technical Report, International Labour Office, Geneva.
Kruger, D. (2007). Coffee production effects on child labor and schooling in rural Brazil. *Journal of Development Economics, 82*, 448–463.
Leibenstein, H. (1957). The theory of underemployment in densely populated backward areas. In G. Akerlof, & J. Yellen (Eds.), *Efficiency wage models of the labor market*. Cambridge University Press.
Maskus, K. E. (1997). *Should core labor standards be imposed through international trade policy?* Policy research working paper 1817, World Bank Development Research Group, The World Bank, Washington, DC.
Neumayer, E., & Soysa, D. I. (2005). Trade openness, foreign direct investment and child labor. *World Development, 33*(1), 43–63.
Patrinos, H. A., & Psacharopoulos, G. (1995). Educational performance and child labor in Paraguay. *International Journal of Educational Development, 15*(1), 47–60.
Pörtner, C. C. (2001). Children as insurance. *Journal of Population Economics, 14*(1), 119–136.
Sharma, A. N. (2003). Impact of social labelling on child labour in carpet industry. *Economic and Political Weekly, 37*(52), 5196–5204.
Stiglitz, J. E. (1976). The efficiency wage hypothesis, surplus labour and the distribution of income. *L.D.C s. Oxford Economic Papers, 28*(2), 185–207.
Subramanian, S., & Deaton, A. (1996). The demand for food and calories. *Journal of Political Economy, 104*(1), 133–162.
Swamy, A. V. (1997). A simple test of the nutrition-based efficiency wage model. *Journal of Development Economics, 53*(1), 85–98.
US Department of Labor. (1997). *By the sweat and toil of children: Consumer labels and child labor*. Technical Report, Bureau of International Labor Affairs.

(*See Overleaf*)

APPENDIX A. SURVEY LOCATION IN DIFFERENT DISTRICTS OF UTTAR PRADESH (INDIA)

Name of districts	Varanasi	Mirzapur	Bhadohi
Name of the location	Chandapur Mahgaon Tilthi Katchariya Kanakpur Jayapur	Purjagir Dengurpatti Chaksari Gazia Gobraha Pakhwaia Barbatta Bhatewra	Sawalepur Pargaaspur Samahi Rampur Ghamapur Hariyanv

APPENDIX B. SURVEY LOCATION IN DIFFERENT DISTRICTS OF KATHMANDU VALLEY (NEPAL)

Name of districts	Kathmandu	Lalitpur	Bhaktapur
Name of the location	Bauddha Bhungmati Chabahil Jorpati Kirtipur Mahankal Swayambhu Koteshwor Sallaghari	Bhaisepati Ekantakuna Nakhkhu Jawalakhel Sat Dobato	Surya Binayak Sanothimi Jagati Thimi